the long-term design filtration capacity of the ecology mix (>14 inches per hour, all belonging to Group A or B soils) would not require an underdrain because all water should fully infiltrate to the subsoils beneath the underdrain if compaction is minimized.

Sizing Procedure

For runoff treatment, sizing an Ecology Embankment is based on the requirement that the runoff treatment flow rate from the pavement area $Q_{Highway}$ cannot exceed the long-term infiltration capacity of the Ecology Embankment, $Q_{Infiltration}$:

$$Q_{Highway} \leq Q_{Infiltration}$$

For western Washington, $Q_{Highway}$ is the flow rate at or below which 91 percent of the runoff volume for the developed TDA will be treated, based on a 15-minute time step (see Section 4-3.1.1), and can be determined using the water quality data feature in MGSFlood. For eastern Washington, $Q_{Highway}$ is the peak flow rate predicted for the 6-month, short duration storm under post-developed conditions for each drainage basin area (see Appendix 4D), and can be determined by selecting the short duration storm option in StormSHED.

The long-term infiltration capacity of the Ecology Embankment is based on the following equation:

$$\frac{LTIR_{EM} * L_{EE} * W_{EE}}{C * SF} = Q_{Infiltration}$$

Where: $LTIR_{EM}$ = Long-term infiltration rate of the Ecology Mix (use 14 inches per hour for design) (in/hr)

L_{EE} = Length of Ecology Embankment (parallel to roadway) (ft)

W_{EE} = Width of the Ecology Embankment (ft)

C = Conversion factor of 43200 ((in/hr)/(ft/sec))

SF = Safety Factor (equal to 1.0 unless unusually heavy sediment loading is expected)

Assuming that the length of Ecology Embankment is the same as the length of the contributing pavement, solve for the width of the Ecology Embankment:

$$W_{EE} \geq \frac{Q_{Highway} * C * SF}{LTIR_{EM} * L_{EE}} \qquad \text{(RT.07-1)}$$

In locations where the pavement width varies it will be necessary to determine W_{EE} for individual sections of roadway. The minimum width of an Ecology Embankment should be rounded up to the nearest foot. The minimum width allowable is 4 feet for constructability and to ensure that it will function as intended. The Dual Ecology Embankment should also be able to pass a 25-year storm with a 1-foot freeboard using the analysis provided in BMP RT.04 Biofiltration Swale.

Materials

Ecology Mix

The ecology mix used in the construction of ecology embankments consists of the amendments listed in Table RT.07.1.

Gravel Backfill

Gravel backfill for pipe bedding should conform to Section 9-03.12(3) of the WSDOT *Standard Specifications*.